Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Examination January 2010

Subject code: 710305

Subject Name: Programmable Logic Controller

Date: 29 / 01 / 2010 **Time: 12.00 – 2.30 pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat diagrams wherever necessary.**

Q.1 **(a)** Draw and explain functional block diagram of PLC. **06**

(b) Discuss merits and demerits of PLC. **06**

Q.2 **(a)** Explain the technique by which PLC scan and execute any ladder program. **06**

(b) Explain PLC memory. **06**

OR

(b) Explain discrete DC output module of the PLC. **06**

Q.3 **(a)** Explain isolated discrete input and output module of the PLC. **06**

(b) Realize 4X1 multiplexer circuit using PLC ladder diagram. **06**

OR

Q.3 **(a)** Develop PLC ladder to realize following Boolean equation: **06**

(i) F = (x+y+z)(abc)

(ii) F = ((x.y') + (a+b) + c) d)

(b) Explain Retentive and off delay timers of the PLC with necessary timing diagrams. **06**

Q.4 **(a)** Explain Greater than or equal to (GEQ) and less than (LES) functions of PLC with suitable examples. **06**

(b) Explain following PLC functions:- **06**

(i) Jump with return (ii) TABLE-TO-REGISTER MOVE

(iii) Bit follow

OR

Q.4 **(a)** Explain PLC shift register and rotate functions. **06**

(b) Develop Ladder Logic Diagram to generate square wave. **06**

Q.5 **(a)** Draw schematic diagram, list the process hardware, Prepare event sequence, construct LLD and show I/O connection details for the following process: **08**

Reactor tank has two inlet valves (A and B) and one outlet(drain) valve (C). Initially tank is empty and valve C is closed. Valve A should open till level in the tank reaches level A. As soon as level A is reached, valve A should be closed and valve B should be opened till tank reaches level B. As soon as level B is reached, valve B should be closed and Heater (H) and Stirrer (S) should be on for 5 minutes. Then valve C should be open until tank becomes empty. The process should be repeated automatically. Use master start and stop push buttons.

(b) Explain fail-safe circuit concept in PLC. **04**

OR

Q.5 **(a)** Develop Ladder Logic Diagram for following processe: **08**

(i) A stacking and banding system (S) requires a spacer to be inserted (I) in a stack of panels after 14 sheets are stacked. After 14 more the stack is to be banded (B) . Assume suitable sensors and output devices required.

(ii) Three teams will press a switch in front of them to fight to be the first to answer a question. The buzzer will sound after any one of the team touches the switch. Light indicator in front of each team will light up and the buzzer is reset only by the host switch. Assume suitable data.

(b) Explain stepper motor working in brief. **04**

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